

A comparative study of effect of oral clonidine and oral metoprolol premedication on vital parameters in microscopic middle ear surgeries

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Abstract

Background: Middle ear surgeries have made a significant progress with the usage of the operating microscope, which magnifies the surgical field many times; however, it also magnifies the blood droplets and thus obscure the surgical field. many pharmacological agents are used to provide oligoemic field. **Aims and Objectives:** The present study was done to compare the effect of oral premedication with clonidine and Metoprolol on intraoperative hemodynamics. **Methodology:** After the Ethics committee approval and informed consent, 50 patients, age group 19-60 years, ASA Grade 1 and 2 for microscopic ear surgery were included into the study carried out at department of Anesthesia of a tertiary health care centre. A Randomized prospective double blind study with 2 groups (25 patients in each group) was conducted: **Group Clonidine:** Patient receiving Oral Clonidine in a dose of 150 µg, **Group Metoprolol:** Patient receiving oral Metoprolol 50 mg, both 90 minutes preoperatively. The statistical analysis was done by unpaired t-test and calculated by SPSS 18 version software. **Result:** Peri-operative mean arterial blood pressure was compared to its basal values in both the groups. Pre-op and 15 min values were comparable. Metoprolol group showed significantly lower MAP at 30-45 60minutes only. Heart rate: Metoprolol group observed a lower Heart rate than Clonidine group with statistically significant (p<0.05) difference at 1,5,30,45,60,75 and 90 minutes intraoperatively. **Conclusion:** It can be concluded from our study that oral metoprolol was better as compared to oral clonidine with respect to vital parameters like Heart rate and MAP, etc.

Key Word: Clonidine, metoprolol, Hemodynamic stability (Vital Parameter).

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INTRODUCTION

Middle ear surgeries have made a significant progress with the usage of the operating microscope, which magnifies the surgical field many times; however, it also magnifies the blood droplets and thus a small amount of blood can obscure the surgical field. Conventional

microscopic ear surgery (MES) using a post-auricular approach remains the most common tympanoplasty technique. There are several pharmacological and non-pharmacological techniques for an appropriate control of intra operative bleeding. The non-pharmacological (mechanical) methods for deliberate hypotension include positioning the patient and IPPV to control venous return. Several pharmacologic agents have been used to produce oligoemic surgical field in microscopic ear surgery. Direct vasodilators as nitroprusside¹⁶ and nitroglycerine, alpha-2 adrenergic agonists as clonidine and dexmedetomidine, beta adrenergic antagonists as propranolol, metoprolol esmolol inhalational anaesthetics as isoflurane, sevoflurane, and N-methyl D-aspartate antagonist as magnesium were used to decrease intraoperative bleeding during middle ear surgery.

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Inappropriate bleeding is one of the complications of ear surgeries because it can lead to poor visibility for the surgeon and visibility is further reduced the longer the time of the intervention is extended. Increased bleeding can also cause surgeons to abandon procedures before they are fully completed. Improvement of intraoperative visibility by reducing bleeding is an important task for an anaesthetist during head and neck surgery.^{12,13,14,15} Studies show that using beta-blockers before surgery reduces long term cardiovascular complications and intraoperative bleeding^{18,19}. The probable mechanism of beta-blockers in hemodynamic control is a reduction and attenuation of the excitatory effect caused by a sudden increase of catecholamine during surgery. It is believed that beta-blockers are responsible for improvement of the cardiovascular condition and patients' hemodynamic stability via changes in stress related physiological response^{18,22}. Clonidine and Metoprolol are commonly used drugs for providing oligoemic field. In this study we have compared the effect of these drugs used orally as pre-medicants for decreasing intraoperative bleeding on the haemodynamic variables during microscopic middle ear surgery Clonidine, a centrally acting alpha₂ adrenergic agonist, which was first introduced into clinical practice as an antihypertensive medication, has been recently used for anaesthetic premedication, providing sedative, anxiolytic, and analgesic effects. Clonidine also attenuates hypertension, tachycardia, and nor-epinephrine release in response to stress. Clonidine is an α -₂ adrenoreceptor agonist. It exerts central sympatholytic effect and has a half-life of 9-12 h⁶ Premedication with clonidine blunts the stress response to surgical stimuli and the narcotic and anaesthetic doses are also reduced. In addition, clonidine increases cardiac baroreceptor reflex sensitivity to increase in systolic blood pressure, and thus stabilises, blood pressure¹¹ Metoprolol is a selective beta-adrenergic blocker without intrinsic sympathicomimetic activity. In high doses it may act upon b₁ and b₂ receptors. It is available for intravenous administration and is perioperatively used to control hypertension and tachyarrhythmias. After intravenous administration, its peak of action occurs in approximately ten minutes and its elimination half-life is 3 to 4 hours. It has a high distribution volume of 5 to 6 L.kg⁻¹, suffers liver metabolization and its inactive metabolites are excreted by urine and feces. Hemodynamic effects are negative chronotropism and inotropism without significant vascular resistance

changes¹⁹. b₁-blocker recovery pharmacodynamics is prolonged and may last more than 12 hours after excessive doses.

METHODOLOGY

After the ethics committee approval and informed consent, 50 patients, age group 19-60 years, ASA Grade 1 and 2 for microscopic middle ear surgery were included into the study carried out at department of Anesthesia of a tertiary health care centre. A Randomized prospective double blind study with 2 groups (25 patients in each group) was conducted: **Group I Clonidine:** Patient receiving Oral Clonidine in a dose of 150 µg, **Group II Metoprolol:** Patient receiving oral Metoprolol 50 mg, both 90 MINUTES prior to surgery. The patients with age between 18-60 years., ASA Grade 1 and 2, were included into the study while, patient who didn't given consent, ASA Grade 3 and 4, hypertensive patients/other ECG changes Asthmatics, Baseline pulse <55/systolic BP <100 mm Hg, H/o Bleeding disorder were excluded from the study. All the patients with written and explained consent underwent General anesthesia with standard anesthetic protocol. Patients were premedicated with IV ranitidine 50 mg, ondansetron 4 mg, midazolam 1 mg Following preoxygenation for 3 min, anesthesia was induced with IV fentanyl 2 µg/kg and Propofol 2 mg/kg. Tracheal intubation was facilitated with suxamethonium 2 mg/kg. Anesthesia was maintained with O₂ and N₂O 50:50, isoflurane up to 1.2 Vol% and Vecuronium 0.02mg/kg to maintain EtCO₂ between 30 and 40 mmHg All patients received lactated Ringer lactate solution at approximately 10 ml/kg/h during 1st h of anesthesia followed by 5 ml/kg/h until the end of surgery. The heart rate (HR) and Mean Arterial blood pressure (MAP) were measured non-invasively by an oscillometric device before induction and thereafter every 15 min up to 105mins. All the vital parameters like HR, MAP were noted and the statistical analysis was done by unpaired t-test and calculated by SPSS 18 version software. On completion of surgery, nitrous oxide and isoflurane were discontinued, and lungs were ventilated with 100% oxygen. Residual neuromuscular blockade was antagonized with neostigmine 2.5 mg and glycopyrrolate 0.5 mg and trachea were extubated following usual extubation criteria. Heart rate (HR), systolic blood pressure (SBP), diastolic blood pressure (DBP), MAP, SpO₂, and EtCO₂ were monitored.

RESULT

Table 1: Age and Weight distribution between groups

	Clonidine Group I		Metoprolol Group II		p-value	Significance
	Mean	SD	Mean	SD		
	Age	25.84	5.014	26.20		
Weight	57.60	6.144	57.96	7.845	0.8574	NS

The mean age and weight were compared by t-test. No significant difference is present between groups with regard to the age and weight of patient.

Table 2: Sex distribution between Groups

	Clonidine Group I	Metoprolol Group II	P-value
Male	14	13	p=0.776, NS
Female	11	12	
Total	25	25	

The study conducted of two groups; Group Metoprolol and Group Clonidine, with 25 patients undergoing Microscopic middle ear surgeries in both the groups (n=25 in each group). Fisher’s test shows no significant difference in the sex of the two groups .

Table 3: Distribution of the patients as per the MAP

Characteristics Duration in minutes after start of surgery	Group I Clonidine (n=25)	Group II Metoprolol (n=25)	P Value	Remarks
Pre-OP MAP	93.84±5.242	92.84±6.42	p>0.05	NS
MAP (15min)	91.84±6.872	89.44±4.976	p>0.05	NS
MAP (30 min)	87.05±4.903	83.12±4.941	P<0.05	S
MAP (45 min)	87.12±5.455	78.73±6.424	P<0.05	S
MAP (60 min)	79.10±4.903	73.40±4.903	P<0.05	S
MAP (75 min)	77.50±4.903	70.40±4.903	P<0.05	NS
MAP (90 min)	86.05±4.903*	87.54±4.903*	p>0.05	NS
MAP (105 min)	91.9±4.903*	89.40±4.903*	p.>0.05	NS

When MAP was compared in the two groups, the basal and 15, min values were comparable. There was a statistically significant difference (p<0.05) in MAP at 30 45, 60min min interval between the two groups with lower values in Group II Metoprolol group. There was no significant difference between groups at 75, 90 and 105 mins (P > 0.05)

Table 6: Distribution of the patients as per the Mean Heart Rate (HR)

Characteristics Duration in minutes after intervention	Group I Clonidine (n=25)	Group II Metoprolol (n=25)	P Value	Remarks
Pre-OP HR	75.84±3.12	76.12±2.43	p>0.05	NS
HR (15min)	73.12±4.98	69.34±3.92	p<0.05	S
HR (30 min)	70.45±3.82	62.32 ±4.19	p<0.05	S
HR (45 min)	72.76± 4.54	63 ±3.76	P<0.001	HS
HR (60 min)	69.45±3.82	62.32 ±4.19	p<0.05	S
HR (75 min)	72.45±3.75	65.01 ±4.09	P<0.05	S
HR (90 min)	73.90±3.65	65±3.09	P<0.01	S
HR (105 min)	79.35±3.75	80.02±2.98	p>0.05	NS

The Pre-OP HR was 75.84±3.12 and 76.12±2.43 was comparable (p>0.05). There was a statistically significant difference in Heart rate in the two groups at 15,30,45,60,75 and 90 mins with p values <0.05 and highly significant difference observed at 45 mins, majority of patients in Group II Metoprolol group observed a lower Heart rate than Group I Clonidine group. There was no statistically significant difference in Heart Rate at 105 mins towards end of surgery.

DISCUSSION

It has been postulated that reduction of MAP during general anesthesia (GA) can minimize intra operative bleeding^{2,3}. However studied have demonstrated that MAP and total blood loss are not necessarily correlated.

Improved surgical field with a beta blocker has been attributed to vasoconstriction of the mucous membrane arterioles and pre-capillary sphincters resulting from unopposed alpha adrenergic effects of endogenous catecholamines⁵ and solely on the effect of MAP. The

effect of clonidine given as an oral pre-anesthetic medication in producing a bloodless surgical field in patients undergoing middle ear surgery was examined by Marchal *et al*⁵ and the patients received clonidine (300 mcg/oral) 90 min prior to surgery. In the study by Nair *et al*⁸ they found a correlation between HR and surgical field grade and they observed a better surgical field with a reduction in HR. The metoprolol group had a significantly lower HR than the placebo group. Premedication with oral clonidine reduced intra operative bleeding and decreased Isoflurane, fentanyl, requirement for achieving controlled hypotension in patients undergoing middle ear surgery². Nitu Puthenveetil²² they found Metoprolol patients showed a statistically lower HR from pre-induction up to 90 min while systolic BP (SBP), diastolic BP (DBP) and mean arterial pressure did not show a significant difference. In our study we have seen that the mean age and weight were compared by t-test. No significant difference is present between groups with regard to the age and weight of patient. In our study we found that patients in Metoprolol group had significantly lower Heart rate as compared to Clonidine group intra operatively. Also the MAP was significantly lower in Metoprolol group only for initial one hour (between 30-60 mins), otherwise all readings were comparable. The reduction in MAP with Metoprolol was limited only during first half hour of surgery but had no significant effect thereafter as compared to Clonidine group.

CONCLUSION

It can be concluded from our study that oral metoprolol used 90 minutes preoperative was better as compared to oral clonidine with respect to vital parameters like Heart rate and Mean Arterial Pressure, etc.

REFERENCES

1. Lee J, Lovell AT, Parry MG, Glaisyer HR, Bromley LM. I. v. clonidine: does it work as a hypotensive agent with inhalation anaesthesia? *Br J Anaesth* 1999; 82: 639-40.
2. Welfringer P, Manel J, Garric J. Clonidine premedication and isoflurane anesthesia to reduce bleeding in otologic surgery. *Ann Fr Anesth Reanim* 1992; 11: 125-31.
3. Marchal JM, Mez-Luque AG *et al*. Clonidine decreases intraoperative bleeding in middle ear microsurgery. *Acta Anaesthesiologica Scandinavica*. 2001; 45: 627-33.
4. Poupak R, Faiz SHR *et al*. Effects of premedication with metoprolol on bleeding and induced hypotension in nasal surgery. *Anesthesiology and Pain Medicine*. 2012; 1(3):157-61
5. Mohseni M, Ebneshahidi A. The effect of oral clonidine premedication on blood loss and the quality of the surgical field during endoscopic sinus surgery: a placebo-controlled clinical trial. *J Anesth*. 2011; 25:614-61
6. Jabalameli M, Hashemi SM, Soltani HA, Hashemi SJ. Oral clonidine premedication decreases intra ope Blau WS, Kafer ER, Anderson JA. Esmolol is more effective than sodium nitroprusside in reducing blood loss during orthognathic surgery. *Anesth Analg* 1992; 75: 172-8.
7. Blau WS, Kafer ER, Anderson JA. Esmolol is more effective than sodium nitroprusside in reducing blood loss during orthognathic surgery. *Anesth Analg* 1992; 75: 172-8.
8. Nair S, Collins M, Hung P, Rees G, Close D, Wormald PJ. The effect of beta-blocker premedication on the surgical fi eld during endoscopic sinus surgery. *Laryngoscope* 2004; 114: 1042-6.
9. Boezaart AP, van der Merwe J, Coetzee A. Comparison of sodium nitroprusside- and esmolol-induced controlled hypotension for functional endoscopic sinus surgery. *Can J Anaesth* 1995;42:373-6
10. Hayashi Y, Maze M. Alpha 2 adrenoceptor agonists and anaesthesia. *Br J Anaesth* 1993; 71: 108-18.
11. Harron DW, Riddell JG, Shanks RG. Effects of azeperole and clonidine on baroreceptor mediated reflex bradycardia and physiological tremor in man. *Br J Clin Pharmacol* 1985;20: 431-6
12. Feig BW, Berger DH, Dougherty TB, Dupuis JF, Hsi B, Hickey RC, *et al*. Pharmacologic intervention can reestablish baseline hemodynamic parameters during laparoscopy. *Surgery*. 1994; 116: 733-9.
13. Malek J, Knor J, Kurzova A, Lopourova M. Adverse hemodynamic changes during laparoscopic cholecystectomy and their possible suppression with clonidine premedication. Comparison with intravenous and intramuscular premedication. *Rozhl Chir*. 1999; 78: 286-91.
14. Gregoretti C, Moglia B, Pelosi P, Navalesi P. Clonidine in perioperative medicine and intensive care unit: more than an anti-hypertensive drug. *Curr Drug Targets*. 2009; 10: 799-814.
15. Aantaa R, Jalonen J. Perioperative use of alpha2.adrenoceptor agonists and the cardiac patient. *Eur J Anaesthesiol*. 2006;23: 361-72.
16. Jacobi KE, Bohm BE, Rickauer AJ, Jacobi C, Hemmerling TM. Moderate controlled hypotension with sodium nitroprusside does not improve surgical conditions or decrease blood loss in endoscopic sinus surgery. *J Clin Anesth*. 2000; 12: 202-7.
17. Simpson P. Perioperative blood loss and its reduction: the role of the anaesthetist. *Br J Anaesth*. 1992; 69(5):498-507.
18. Jakobsen CJ, Blom L. Effect of pre-operative metoprolol on cardiovascular and catecholamine response and bleeding during hysterectomy. *Eur J Anaesthesiol*. 1992; 9(3):209-15.
19. Habler O. [Controlled hypotension]. *Anaesthesist*. 2000; 49(7):687-9.
20. Rodrigo C. Induced hypotension during anesthesia with special reference to orthognathic surgery. *Anesth Prog*. 1995; 42(2):41-58.
21. Mikawa K, Nishina K, Maekawa N, *et al*. Attenuation of the catecholamine response to tracheal intubation with oral propranolol. *Can J Anaesth*. 1999;42:829-34

22. Puthenveetil, N., Rajan, S., Kumar, L., and Nair, S. (2013). A comparison of effects of oral premedication with clonidine and metoprolol on intraoperative hemodynamics and surgical conditions during functional endoscopic sinus surgery. *Anesthesia: Essays and Researches*, 7(3), 371.
23. Sunitha K.Zachariah, Sara Ninan. Hemodynamic Responses to Microlaryngoscopy in ENT Patients -A Comparative Study of Premedication with Oral Clonidine and Metoprolol *Int J Med Health Sci*. Oct 2015,Vol-4;Issue-4.

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